| | |
|---|---|
| Designation: | BVS MODEL PPE-400 |
| Manufacturer: | Brandywine Valley Sales Company<br>20 East Main Street<br>Honey Brook, Pennsylvania 19344<br>Phone (215) 273-2841 |
| Sampler Intake: | Plastic cylindrical sampling probe which is gravity filled. A row of small holes around the circumference near the bottom forms an inlet screen; weighted base. |
| Gathering Method: | Forced flow due to pneumatic ejection. |
| Sample Lift: | Up to 85m (280 ft); requires one pound of pressure for every 0.6m (2 ft) of vertical lift. |
| Line Size: | 0.3 cm (1/8 in.) I.D. |
| Sample Flow Rate: | Depends upon pressure setting and lift. |
| Sample Capacity: | Sample chamber volume is 50 mℓ; sample composited in 9.5ℓ (2.5 gal) container. |
| Controls: | Pressure regulator connecting gas supply is set between 0.35 and 9.8 kg/sq cm (5 and 140 psi) depending upon lift required; 0.5 to 100 second sample duration; otherwise similar to Model PE-400. |
| Power Source: | 115 VAC plus pressurized gas supply. |
| Sample Refrigerator: | Model PPER-400 is refrigerated, but case is not weatherproof. |
| Construction Materials: | Sampling probe is PVC standard; teflon and stainless steel are available. Plastic sampling line standard; teflon is available; |

Figure 4. BVS Model SE and SPE Series Sampler

Photograph Courtesy of Brandywine Valley Sales Company

| | |
|---|---|
| | Polyethylene sample container; Armorhide finished aluminum case. |
| Basic Dimensions: | Non-refrigerated - 35.6 x 35.6 x 53.3 cm (14x14x21 in.); refrigerated - 53.3 x 58.4 x 96.5 cm (21x23x28 in.); both models portable. |
| Base Price: | Basic unit handling up to 0.3 cm (1/8 in.) solids is $1,450; Model PPE-500 for solids up to 0.6 cm (1/4 in.) is $1,600; Model PPE-600 for solids up to 0.95 cm (3/8 in.) is $1,750; Model PPE-700 for solids up to 1.3 cm (1/2 in.) is $2,000; add $300 for refrigerated version. Stationary (SPE) models with features of the SE-400 (except for flow-regulating valves and manual sample take-off line) are about $1,600 more than comparable PPE models. |
| General Comments: | Basic unit is similar to PE-400 but utilizes pressure to lift the sample as does model PP-100. |

BVS Model PPE-400 Evaluation

1. Sampling probe is vulnerable to blockage of a number of sampling parts at one time by paper, rags, plastic, etc. Sampling train is unobstructed 0.3 cm (1/8 in.) I.D. tube which should pass small solids. No pump to clog.

2. Obstruction to flow will depend upon user mounting of intake.

3. Sampling chamber will fill immediately following intake screen purge at end of previous cycle. Circulation of flow through chamber would appear to be limited, resulting in a sample not necessarily representative of conditions in the sewer at the time of the next triggering signal.

4. Movement of solids should not hamper operation.

5. No automatic starter. A self-cleaning feature for the intake screen is accomplished by using vent pressure from the timing valve to purge it.

6. Collects fixed size aliquots at either preset time intervals or paced by external flowmeter option and composites them in a suitable container.

7. Special sampling probe available for surface oil sampling, etc.; appears unsuitable for sampling coarser bottom solids.

8. Automatic refrigerated sample compartment available. Some cross-contamination appears likely.

9. Unit appears capable of manhole operation.

10. Case is weatherproof but will not withstand total immersion.

11. Optional winterizing kit is available for use in very cold climates.

12. Unit has a very wide range of operating head conditions. High lifts will result in faster depletion of gas supply.

| | |
|---|---|
| Designation: | CHICAGO "TRU TEST" |
| Manufacturer: | Chicago Pump Division<br>FMC Corporation<br>622 Diversey Parkway<br>Chicago, Illinois 60614<br>Phone (312) 327-1020 |
| Sampler Intake: | Provided by user, a screen with maximum openings of 1.3 cm (0.5 in.) recommended; sampler has standard 5 cm (2 in.) pipe inlet. |
| Gathering Method: | External head to provide flow through a sampling chamber from which a rotating dipper extracts a sample aliquot and transfers it to a funnel where it is gravity fed to a composite bottle. |
| Sample Lift: | Not applicable. |
| Line Size: | Smallest line in sampling train is the one connecting the funnel to the sample bottle; it appears to be about 2.5 cm (1 in.). |
| Sample Flow Rate: | Recommended flow rate through sampler is 95 to 190 ℓpm (25 to 50 gpm) with 133 ℓpm (35 gpm) as optimum. Minimum velocity in inlet line, 5 cm (2 in.) diameter recommended, should be 0.6m (2 ft) per second. Below 95 ℓpm (25 gpm) fungus growth and settling in sampling chamber will affect the sample quality. |
| Sample Capacity: | Sampling dipper collects a 25 mℓ sample; a 7.6ℓ (2 gal) composite container is provided. |
| Controls: | Constant rate sampling (between 3 and 20 samples per hour) is controlled by built-in timer; flow proportional sampling provided by either transmitter control or totalizer control from external flow measuring device. |
| Power Source: | 110 VAC electricity. |

| | |
|---|---|
| Sample Refrigerator: | Automatic refrigerator to maintain samples at 4° to 10°C is available. |
| Construction Materials: | Bisphenol polyester resin, polypropylene, stainless steel, and polyethylene; case is laminated fiberglass. |
| Basic Dimensions: | 49 x 53 x 132 cm (19 x 21 x 52 in.); designed for fixed installation. |
| Base Price: | $2,600 non-refrigerated.<br>$3,200 refrigerated. |
| General Comments: | Sampling chamber has adjustable weir plates to regulate the sewage level. Manufacturer recommends that intake line be limited to 15.2m (50 ft) or less in length. |

Chicago "Tru Test" Evaluation

1. Should be free from clogging. Sampling intake must be designed by user.

2. Sampler itself offers no flow obstruction.

3. Should operate well over entire range of flow conditions.

4. Movement of solids should not hamper operation.

5. Designed for continuous operation; no automatic starter. Continuous flow serves a self cleaning function and should minimize cross-contamination.

6. Can collect either flow proportional or fixed time interval composites.

7. Ability to collect samples of floatables and coarser bottom solids will depend upon design of sampling intake.

8. Automatic refrigeration maintains samples at 4° to 10°C. Offers good sample protection and freedom from precontamination; sample composite bottle is sealed to funnel with hose clamps.

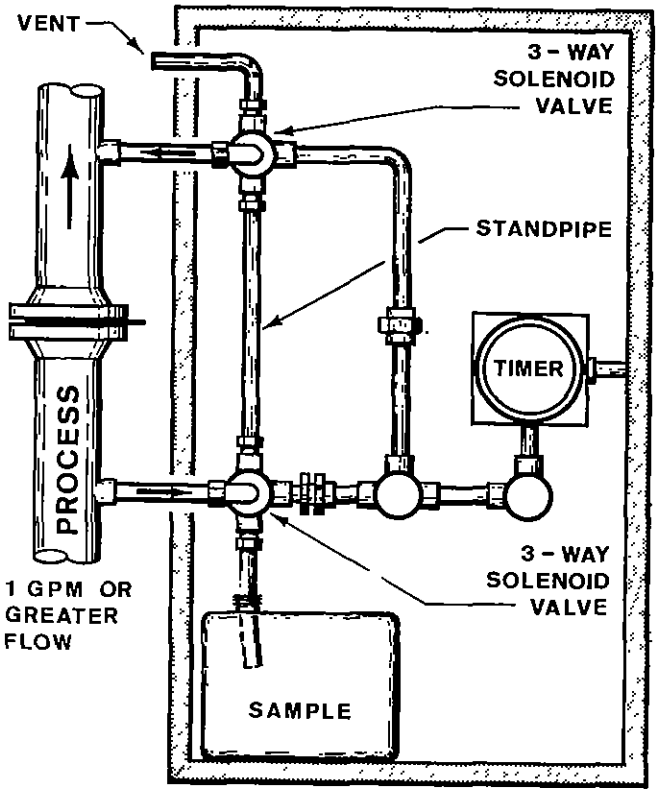
9. Not designed for confined space or manhole operation.

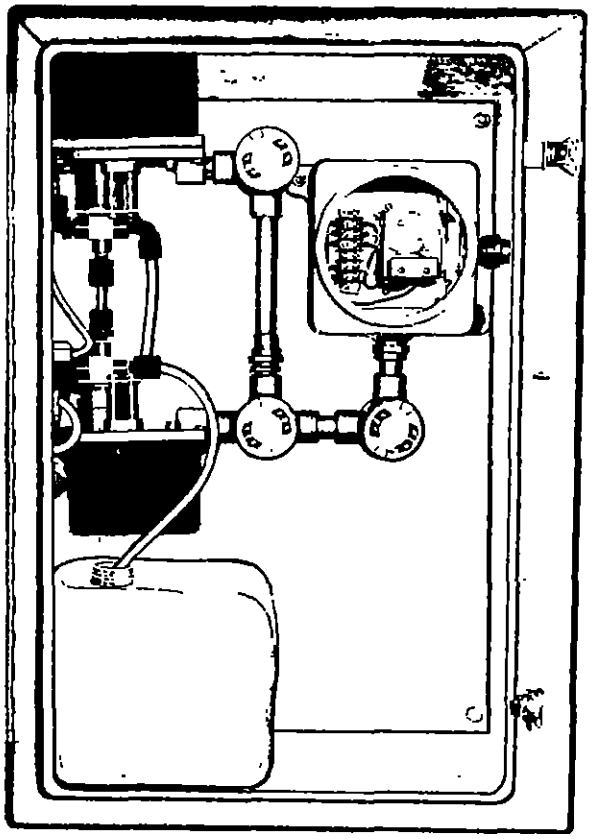
10. Cannot withstand total immersion.

11. Does not appear capable of prolonged exposure to extremely cold ambient conditions.

12. Operating head is provided by user.

| | |
|---|---|
| Designation: | COLLINS MODEL 42 COMPOSITE SAMPLER |
| Manufacturer: | Collins Products Company<br>P.O. Box 382<br>Livingston, Texas 77351<br>Phone (713) 327-4200 |
| Sampler Intake: | Provided by user. |
| Gathering Method: | External head to cause sample to flow continuously through a standpipe assembly until two, three-way valves are energized, whereupon incoming and return flows are blocked and the sample trapped in the standpipe drains into the collection container. |
| Sample Lift: | Not applicable. |
| Line Size: | The smallest passage is 0.2 cm (3/32 in.) in the solenoid valve; 0.5 cm (3/16 in.) with optional ball valve. |
| Sample Flow Rate: | As provided by user; minimum of 3.8 ℓpm (1 gpm) at a minimum pressure of 0.14 kg/sq cm (2 psi). |
| Sample Capacity: | Fixed size (normally 6 mℓ) aliquots are composited in a 9.5ℓ (2.5 gal) collapsible plastic container. |
| Controls: | Constant rate sampling (normally one aliquot every 70-80 seconds) is controlled by built-in timer; flow proportional operation achieved by connecting to external flow totalizer providing either a contact closure or a pulse (24 VDC, 115 VDC, or 115 VAC), or to a 0.2 to 1.1 kg/sq cm (3 to 15 psi) pressure source proportional to flow depth (linear, 1/2, 3/2, and 5/2 exponent laws available). |



EXPLOSION-PROOF MODEL
WITH BALL VALVE

Figure 5. Collins Model 42 Composite Sampler

Photograph Courtesy Collins Products Co.

| | |
|---|---|
| Power Source; | 115 VAC |
| Sample Refrigerator: | Available as an option. |
| Construction Materials: | Sampling train would appear to be plastic, stainless steel, and brass. Casing is corrosive-resistant fiberglass. The refrigerated model has a baked enamel-covered steel enclosure with plastic interior. |
| Basic Dimensions: | Weatherproof enclosures for refrigerator models are 76 x 61 x 183 cm (30x24x72 in.); designed for fixed installation. |
| Base Price: | $985; add $16 for refrigerator; $610 for refrigerator in weather-proof enclosure; $210 for ball valve model; and $27 for delay relay, $300 for predetermined counter, or $630 for integrating flow proportional operation. |
| General Comments: | A standpipe assembly accurately measures the amount of sample taken. Flow is maintained in a turbulent state to keep solids suspended. Sample through sampler continuously purges out system where sample pulse switch is in off position. Sampler was originally designed to take samples from pressurized systems such as pipelines. A wood or angle iron frame is optionally available for mounting the sampler, pump, and motor. In the refrigerated Model 42, the electronics and standpipe assembly is mounted on top of the refrigerator with the collection tube running inside. The refrigerated model is non-explosionproof and housing should be provided for it. A thermostat-controlled heater is optionally available for cold weather operation. |

Collins Model 42 Evaluation

1. Should be relatively free from clogging, but even the ball valve model could experience difficulty with some flows unless an intake screen is provided by user. Continuous flow helps to remove particle buildup. Sampling intake must be designed by user.

2. Sampler itself offers no flow obstruction.

3. Should operate reasonably well over entire range of flow conditions.

4. Movement of small solids should not hamper operation.

5. No automatic starter since it is designed for continuous flow. This serves as a self-cleaning function and should minimize cross-contamination.

6. Collects fixed-size aliquots from a continuous flow triggered by a preset timer or external flowmeter and composites them in a suitable container. Representativeness of sample will be a function of intake which is not a part of this unit.

7. Ability to collect samples of floatables and coarser bottom solids will depend upon design of sampling intake.

8. Refrigeration available as an option. Due to continuous flow, cross-contamination should be minimized.

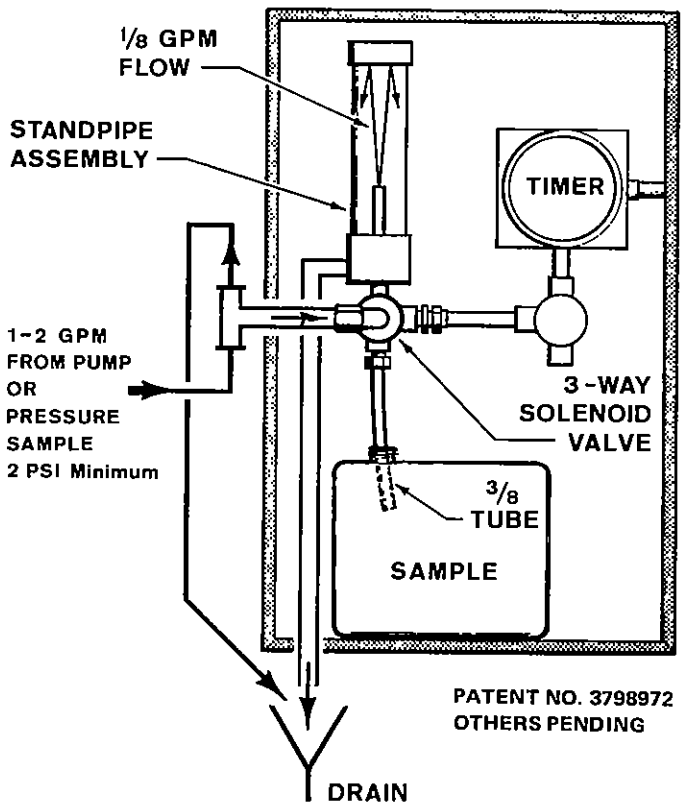
9. Not designed for manhole operation.

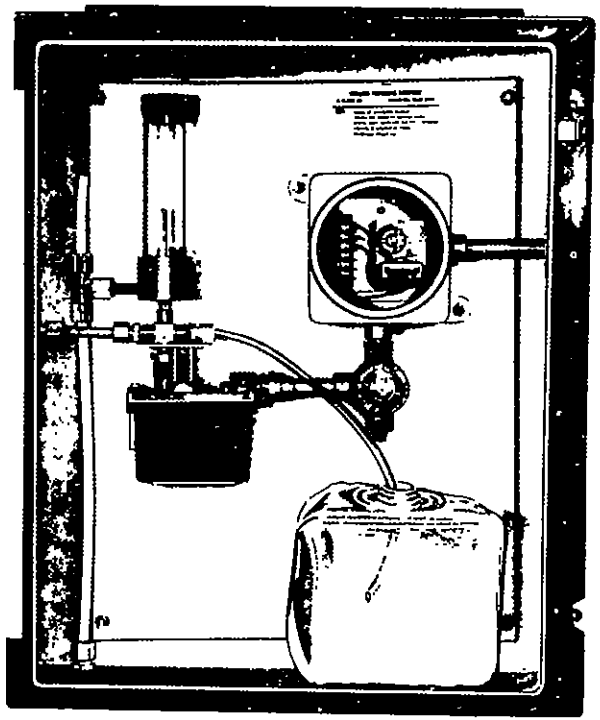
10. Cannot withstand total immersion.

11. Not suited for prolonged operation in extremely cold climates unless provided with optional heating element.

12. Operating head is provided by user.

| | |
|---|---|
| Designation: | COLLINS MODEL 40 COMPOSITE SAMPLER |
| Manufacturer: | Collins Products Company<br>P.O. Box 382<br>Livingston, Texas 77351<br>Phone (713) 327-4200 |
| Sampler Intake: | Provided by user. |
| Gathering Method: | External head to provide continuous flow through the sampler. A portion of this flow is diverted to a metering standpipe from which it is periodically dumped into the sample container. |
| Sample Lift: | Not applicable. |
| Line Size: | The smallest passage is 0.2 cm (3/32 in.) in the solenoid valve; 0.5 cm (3/16 in.) with optional ball valve. |
| Sample Flow Rate: | User must provide a minimum pressure of 0.14 kg/sq cm (2 psi) for a flow of 3.8-7.6 ℓpm (1-2 gpm). |
| Sample Capacity: | Fixed size (normally 3 mℓ) aliquots are composited in a 9.5ℓ (2.5 gal) collapsible plastic container. |
| Controls: | Same as Model 42 except built-in timer normally triggers every 30 seconds. |
| Power Source: | 115 VAC |
| Sample Refrigerator: | Available as an option. |
| Construction Materials: | Same as Model 42. |
| Basic Dimensions: | Same as Model 42. |
| Base Price: | $835; all add-ons priced same as Model 42. |



EXPLOSION-PROOF MODEL
WITH BALL VALVE

Figure 6. Collins Model 40 Composite Sampler

Photograph Courtesy of Collins Products Co.

General Comments: This unit uses a single three-way valve and a vertical standpipe through which a portion of the continuous flow from an external pump or other pressure source is circulated before going to drain. Otherwise it is similar to Model 42 and will not be separately evaluated.

| | |
|---|---|
| Designation: | EMA MODEL 200 |
| Manufacturer: | Environmental Marketing Associates<br>3331 Northwest Elmwood Drive<br>Corvallis, Oregon 97330<br>Phone (503) 752-1541 |
| Sampler Intake: | Perforated end of suction pipe attached to an adjustable mounting bracket. |
| Gathering Method: | Forced flow from solenoid activated piston. |
| Sample Lift: | Less than 0.9m (1 ft). |
| Line Size: | 0.95 cm (3/8 in.) I.D. |
| Sample Flow Rate: | Unknown |
| Sample Capacity: | 21 mℓ aliquots are composited in a suitable container. |
| Controls: | Aliquots can be taken at intervals from 2 to 30 minutes paced by an adjustable timer, or as paced by an external flowmeter. |
| Power Source: | 110 VAC or 12 VDC |
| Sample Refrigerator: | Sample container is housed in an insulated chest that allows for ice cooling. |
| Construction Materials: | Housing is PVC, piston is lucite, and piston shaft is aluminum. |
| Basic Dimensions: | Basic model appears to be about 107 cm (3.5 ft) high. |
| Base Price: | Model 200 ac - $199<br>Model 200 dc - $249 (without battery)<br>Model 200 dc floating - $456 (without battery) |

General Comments: A battery operated floating model is available mounted on a pontoon float. Unit must be mounted at point of sampling since it is not designed to discharge to higher elevations. The sampler is furnished with an adjustable mounting bracket that supports both the sampler and sample container.

EMA Model 200 Evaluation

1. Sampler intake is vulnerable to blockage by rags or debris. A 0.95 cm (3/8 in.) sampling train has a fitting obstruction at point of attachment to main housing.

2. Unit offers a rigid obstruction to flow.

3. Sampling chamber will fill immediately following discharge of previous aliquot, a part of this coming from undischarged sample. Circulation of flow through chamber would appear to be limited, resulting in a sample not necessarily representative of conditions in the sewer at the time of the next triggering signal. Representativeness of suspended solids is also questionable.

4. Movement of small solids should not affect operation; large objects could damage (or even physically destroy) the unit unless special protection is provided by user.

5. No automatic starter; an intake purge of sorts is provided by the design which allows the piston to force some of the sample back out of the inlet ports at the beginning of each stroke.

6. Collects fixed size aliquots (volume may vary with flow depth) paced by a built-in timer or external flowmeter and composites them in a suitable container.

7. Does not appear suitable for collecting either floatables or coarser bottom solids.

8. No refrigeration, some sample protection provided by insulated chest. Cross-contamination appears very likely. Limited lift may require placing sampler in a vulnerable location.

9. Unit would appear capable of manhole operation. Limitations will depend on user installation of mounting brackets.

10. Unit cannot tolerate submersion.

11. Not suited for operation in freezing ambients.

12. The unit is extremely limited in range of operational head conditions and does not appear suitable for flows with varying depths.

| | |
|---|---|
| Designation: | ETS FIELDTEC SAMPLER MODEL FS-4 |
| Manufacturer: | ETS Products<br>12161 Lackland Road<br>St. Louis, Missouri 63141<br>Phone (314) 878-1703 |
| Sampler Intake: | Plastic inlet strainer installed to suit by user. |
| Gathering Method: | Suction lift from peristaltic pump. |
| Sample Lift: | 8.8m (29 ft) maximum. |
| Line Size: | 0.6 cm (1/4 in.) I.D. typical. |
| Sample Flow Rate: | Approximately 1.2ℓ (1/3 gal) per hour depending on tube size used. |
| Sample Capacity: | Continuous flow from pump sequentially fills 12 individual 3.8ℓ (1 gal) sample containers over a 24-hour period. |
| Controls: | On/off switch. A kit is available for changing the timing sequence (time period represented in one bottle). |
| Power Source: | 115 VAC |
| Sample Refrigerator: | None. |
| Construction Materials: | Sampling train is all plastic; frame and case are aluminum with enamel finish. |
| Basic Dimensions: | 46 x 112 x 53 cm (18x44x21 in.); weighs approximately 32 kg (70 lbs); portable. |
| Base Price: | $1,095; time conversion kit is $16. |

General Comments: Refrigeration or heating accessory available. Motor and pump can be easily removed to a remote location. Pump will discharge up to 14m (46 ft) head. A synchronous timing motor pulls a nylon rider holding the discharge tube along a track over a distribution tray to fill bottles.

ETS Fieldtec Model FS-4 Evaluation

1. Unit should be relatively free from plugging or clogging due to inlet strainer and peristaltic pump design.

2. Obstruction of flow will depend upon user mounting of intake.

3. Should operate reasonably well under all flow conditions, but low intake velocity could affect sample representativeness at high flow rates.

4. Movement of solids within the fluid flow should not affect operation adversely.

5. No automatic starter; no self-cleaning feature.

6. Unit takes 12 individual gallon samples over a 24-hour period.

7. Unit does not appear suitable for collecting either floatables or coarser bottom solids.

8. Unit offers reasonable sample protection.

9. Unit is not designed for manhole operation; however, motor and pump assembly can be detached for use in manholes.

10. Unit cannot withstand total immersion.

11. Optional heater should allow unit to withstand freezing ambients.

12. Unit should be able to sample over a wide range of operating head conditions.

| | |
|---|---|
| Designation: | HORIZON MODEL S7570 |
| Manufacturer: | Horizon Ecology Company<br>7435 North Oak Park Avenue<br>Chicago, Illinois 60648<br>Phone (312) 647-7644 |
| Sampler Intake: | Weighted end of suction tube installed to suit by user. |
| Gathering Method: | Suction lift from peristaltic pump. |
| Sample Lift: | 9m (30 ft) maximum. |
| Line Size: | Varies from 0.08 to 0.8 cm (0.0315 to 0.313 in.) I.D., depending upon pump head chosen. |
| Sample Flow Rate: | Depends upon lift and pump head chosen, but typically under 100 mℓ per minute. |
| Sample Capacity: | Collects a grab sample whose size depends upon pump running time. |
| Controls: | On/off switch plus power selection switch for internal battery operation, AC operation, 12 VDC operation, recharge on 12 VDC, or recharge on AC. |
| Power Source: | Internal battery, 12 VDC, or 115 VAC. |
| Sample Refrigerator: | None. |
| Construction Materials: | Sampling train is uninterrupted Tygon tube; silicone or other tube materials available. |
| Basic Dimensions: | Approximately 30 x 20 x 18 cm (12x8x7 in.); weighs 7.7 kg (17 lbs); portable. |

| | |
|---|---|
| Base Price: | Approximately $411 for a complete unit; S7570 is $335, pump head is $40, tubing is typically $21 for a 15.2m (50 ft) coil, and intake weight is $15. |
| General Comments: | Actually a field sampling pump rather than a complete system. |

Horizon Model S7570 Evaluation

1. Without a screen, intake is vulnerable to plugging; unbroken tube and peristaltic pump should be relatively free from clogging.

2. Obstruction to flow is minimal.

3. Should operate reasonably well under all flow conditions, but fairly low intake velocity could affect sample representativeness at high flow rates.

4. Movement of solids should not hamper operation.

5. Designed for attended use only.

6. Unit takes mechanical grab samples.

7. Unit does not appear suitable for collecting floatables or coarser bottom solids.

8. Sample protection provided by user.

9. Unit can operate in manhole environment.

10. Unit cannot withstand total immersion.

11. Since designed for attended use, freezing ambients present no great problem.

12. Unit should operate reasonably well over a wide range of operating head conditions.

| | |
|---|---|
| Designation: | HORIZON MODEL S7576 |
| Manufacturer: | Horizon Ecology Company<br>7435 North Oak Park Avenue<br>Chicago, Illinois 60648<br>Phone (312) 647-7644 |
| Sampler Intake: | Weighted end of suction tube installed to suit by user. |
| Gathering Method: | Suction lift from peristaltic pump. |
| Sample Lift: | 9m (30 ft) maximum. |
| Line Size: | Varies from 0.08 to 0.8 cm (0.0315 to 0.313 in.) I.D. depending upon pump head chosen. |
| Sample Flow Rate: | Depends upon lift and pump head chosen, but typically under 100 mℓ per minute. |
| Sample Capacity: | Collects aliquots (whose size depends upon pump running time) every 15 minutes and composites them in a user supplied container. |
| Controls: | On/off switch plus timer that controls duration of pump run as a percentage of 15 minutes. |
| Power Source: | 115 VAC |
| Sample Refrigerator: | None. |
| Construction Materials: | Sampling train is uninterrupted Tygon tube; silicone or other tube materials available. |
| Basic Dimensions: | Approximately 30 x 20 x 18 cm (12x8x7 in.); weighs 4 kg (9 lbs); portable. |
| Base Price: | Approximately $216 for a complete unit; S7576 is $140, pump head is $40, tubing is typically $21 for a 15.2m (50 ft) coil, and intake weight is $15. |

General Comments: User must supply sample container and protection to complete this unit.

Horizon Model S7576 Evaluation

1. Without a screen, intake is vulnerable to plugging; unbroken tube and peristaltic pump should be relatively free from clogging.

2. Obstruction to flow is minimal.

3. Should operate reasonably well under all flow conditions, but fairly low intake velocity could affect sample representativeness at high flow rates.

4. Movement of solids should not hamper operation.

5. No automatic starter; no self-cleaning features.

6. Unit takes adjustable, fixed-size aliquots and composites them in a user supplied container.

7. Unit does not appear suitable for collecting floatables or coarser bottom solids.

8. Sample protection provided by user.

9. Unit can operate in manhole environment.

10. Unit cannot withstand total immersion.

11. Not suited for operation in freezing ambients.

12. Unit should operate reasonably well over a wide range of operating head conditions.

| | |
|---|---|
| Designation: | HORIZON MODEL S7578 |
| Manufacturer: | Horizon Ecology Company<br>7435 North Oak Park Avenue<br>Chicago, Illinois 60648<br>Phone (312) 647-7644 |
| Sampler Intake: | Weighted end of suction tube installed to suit by user. |
| Gathering Method: | Suction lift from peristaltic pump. |
| Sample Lift: | 9m (30 ft) maximum. |
| Line Size: | 0.49 cm (0.192 in.) I.D. |
| Sample Flow Rate: | Depends upon lift, but typically under 100 mℓ per minute. |
| Sample Capacity: | Collects adjustable size aliquots (30, 89, or 118 mℓ) and composites them in a 9.7ℓ (2.5 gal) container. |
| Controls: | Time intervals at which unit samples are switch selectable for once every 15 minutes, once every 30 minutes, or continuously; aliquot size is switch selectable. |
| Power Source: | Internal battery, 115 VAC charger. |
| Sample Refrigerator: | None. |
| Construction Materials: | Sampling train is uninterrupted Tygon tube (silicone or other tube materials available); sample container is polyethylene; case is ABS plastic. |
| Basic Dimensions: | Approximately 41 x 23 x 56 cm (16x9x22 in.); weighs 12.6 kg (28 lbs); portable. |

| | |
|---|---|
| Base Price: | $595. Battery charger is $68. |
| General Comments: | Tube directs any accidental overflow outside the case to prevent damage. |

Horizon Model S7578 Evaluation

1. Without a screen, intake is vulnerable to plugging; unbroken tube and peristaltic pump should be relatively free from clogging.
2. Obstruction to flow is minimal.
3. Should operate reasonably well under all flow conditions, but fairly low intake velocity could affect sample representativeness at high flow rates.
4. Movement of solids should not hamper operation.
5. No automatic starter; no self-cleaning features.
6. Unit takes adjustable fixed size aliquots and composites them in a suitable container.
7. Unit does not appear suitable for collecting floatables or coarser bottom solids.
8. No refrigeration; cross-contamination appears likely.
9. Unit can operate in manhole environment.
10. Unit cannot withstand total immersion.
11. Not suited for operation in freezing ambients.
12. Unit should operate reasonably well over a wide range of operating head conditions.

| | |
|---|---|
| Designation: | HYDRAGUARD AUTOMATIC LIQUID SAMPLER |
| Manufacturer: | Automatic Samplers<br>850 Kees Street<br>Lebanon, Oregon 97355<br>Phone (503) 258-2628 |
| Sampler Intake: | End of rigid metal metering chamber. |
| Gathering Method: | Forced flow due to pneumatic ejection. |
| Sample Lift: | Depends upon pressure, but in excess of 9m (30 ft). |
| Line Size: | 0.6 cm (0.25 in.) I.D. (standard). |
| Sample Flow Rate: | Depends upon pressure and lift. |
| Sample Capacity: | Aliquots of volume proportional to flow depth are composited in a user-supplied container. |
| Controls: | Sampling interval is adjustable via a needle valve. An optional electronic control unit is available to operate sampler from flowmeter contacts. |
| Power Source: | Regulated 1.4 kg/sq cm (20 psi) air supply. 115 VAC required with optional electronic control unit. |
| Sample Refrigerator: | None. |
| Construction Materials: | Sampling train is all stainless steel, inlet valve is rubber; control unit is cast aluminum. |
| Basic Dimensions: | Depends upon model, but all are under 91 cm (36 in.) long and will pass through a 15 cm (6 in.) diameter opening. |

Base Price: Model HP-1 (aliquot size linear with flow depth) is $246; Model HP-2 (HP-1 with enlarged sample chamber, lines, and inlet hole) is $286; FP Series (aliquot size characterized for depth in Parshall flume or weirs) is $379; FPE Series (FP series with enlarged sample chamber, lines, and inlet hole) is $401; Model A-1 (adjustable aliquot size is independent of flow depth) is $286; air compressor is $140; portable air tank with pressure regulator is $76.

General Comments; At the start of sampling cycle, liquid flows through the inlet port, displacing the inlet valve, and rises in the sample chamber and outlet tube, to the height of liquid flowing through the flume or weir. Air pressure, in the control chamber of the control relay, holds a diaphragm over the air supply port. This pressure bleeds to atmosphere through a needle valve. When the pressure in the control chamber bleeds low enough, the diaphragm moves away from the air inlet port, allowing air to enter the sample chamber. Air pressure exerted on the liquid in the sample chamber will seal the inlet valve, and force the sample out the outlet tube, to the sample container. As air enters the sample chamber, some air flows through the check valve (in the control relay) into the control chamber. When air pressure in the control chamber is equal to the pressure in the operating chamber, a spring forces the diaphragm back over the air inlet. The air is now shut off, and the sample again rises in the sample chamber, ready for the next cycle.

Hydraguard Liquid Sampler Evaluation

1. Single small sample inlet hole would appear vulnerable to blockage unless user provides a screen; remainder of sample train should be clog-free.

2. Sample intake presents a rigid obstruction to the flow.

3. Sampling chamber will fill immediately following discharge of previous aliquot. Circulation of flow through chamber would appear to be limited, resulting in a sample not necessarily representative of conditions in the sewer at the time of next triggering. Representativeness is also questionable at high flow rates.

4. Movement of small solids should not affect operation; large objects could damage (or even physically destroy) the unit unless special protection is provided by user.

5. No automatic starter; no self-cleaning feature.

6. Collects either variable size aliquots at constant time intervals or constant size aliquots paced by an external flowmeter, and composites them in a user-supplied container.

7. Appears unsuitable for collection of either floatable materials or coarser bottom solids.

8. No refrigeration available. Cross-contamination appears likely.

9. Unit appears suitable for manhole operation.

10. Will not withstand total immersion.

11. Should be operable in freezing ambients.

12. Should be very little restriction on operating head conditions.

| | |
|---|---|
| Designation: | HYDRA-NUMATIC COMPOSITE SAMPLER |
| Manufacturer: | Hydra-Numatic Sales Company<br>65 Hudson Street<br>Hackensack, New Jersey 07602<br>Phone (201) 489-4191 |
| Sampler Intake: | End of suction tube installed to suit by user. |
| Gathering Method: | Suction lift from centrifugal pump. |
| Sample Lift: | Up to 4.6m (15 ft). |
| Line Size: | 1.3 cm (1/2 in.) I.D. |
| Sample Flow Rate: | 5.7 ℓpm (1.5 gpm). |
| Sample Capacity: | Aliquot size is adjusted (based upon anticipated flow rates where external flowmeter is to be employed) to fill the 19ℓ (5 gal) composite container in 24 hours. |
| Controls: | Sampler receives signals from external flow meter through a primary relay and clock system, the clock serving as a memory-collecting impulses representing a given flow - at which time a known, pre-set volume of sample is drawn. The volume of sample is controlled by a finely calibrated clock which opens a free-port solenoid valve for a preset time period thereby diverting the flow to the sample container. A built-in timer can be used to pace the sampler when no flow meter is available. It can either be programmed if rough estimates of daily flow variations are known or function as a fixed time interval pacer. |
| Power Source: | 115 VAC electricity. |
| Sample Refrigerator: | None |

| | |
|---|---|
| Construction Materials: | Polyethylene sample container, Tygon sampling lines with bronze fittings and connections, bronze valves and pump, stainless steel available as alternate; cabinet is stainless steel. |
| Basic Dimensions: | 91 x 33 x 91 cm (36x13x36 in.); portable. |
| Base Price: | $1800. |

Hydra-Numatic Composite Sampler Evaluation

1. Fairly large line size and "non-clog" pump should give freedom from clogging; manufacturer recommends unit for streams with high solids content.

2. Obstruction of flow will depend upon way user mounts intake tube.

3. Should operate reasonably well over all flow conditions.

4. Solids in the fluid flow should not impede operation.

5. No automatic starter. Continuous flow serves a self-cleaning function.

6. Unit collects aliquots paced by external flowmeter or built-in timer and composites them in a suitable container.

7. Collection of samples of floatables and bottom solids would require specially designed intake by user.

8. No refrigeration available; sample would appear to be reasonably well protected from damage.

9. Unit appears capable of operation in a high humidity environment, but is too large to pass down a standard manhole.

10. Unit cannot withstand total immersion.

11. Unit appears able to tolerate freezing ambients, at least for moderate periods of time.

12. Lift limit of 4.6m (15 ft) poses some restrictions on use of unit.

| | |
|---|---|
| Designation: | ISCO MODEL 1392 |
| Manufacturer: | Instrumentation Specialties Co.<br>Environmental Division<br>P.O. Box 5347<br>Lincoln, Nebraska 68505<br>Phone (402) 799-2441 |
| Sampler Intake: | Weighted plastic cylindrical strainer with four rows of five 0.3 cm (1/8 in.) holes evenly spaced around its periphery. |
| Gathering Method: | Suction lift from peristaltic pump. |
| Sample Lift: | 7.9m (26 ft) maximum lift; 96% delivery at 2.4m (8 ft), 80% at 5.5m (18 ft). |
| Line Size: | 0.64 cm (1/4 in.) I.D. |
| Sample Flow Rate: | Up to 1.5 ℓpm (0.4 gpm) depending upon lift. |
| Sample Capacity: | Sample size can be switch selected from 40 mℓ to 460 mℓ at 0.9m (3 ft) lift. 28-500 mℓ plastic sample bottles (350 mℓ glass bottles with special base optional) are provided and are used for collecting discrete samples or up to four-sample sequential composites when used with the optional multiplexer. Alternately, if the sample bottles are removed, a single composite sample of up to 26.5ℓ (7 gal) may be collected directly in a single container in the base section. |
| Controls: | The time interval between collections can be varied in 1/2 hour increments from 1/2 to 6 hours; optional timers can be varied in 15 minute increments to 3 hours or in 10 minute increments to 2 hours. All use a clock mechanism rather than a repeat cycle timer. Connections for an external flowmeter (ISCO Model 1470 only) to collect samples on the basis of stream flow |

Figure 7. ISCO Model 1392 Sampler

Photograph courtesy of Instrumentation Specialities Co., Inc.

| | |
|---|---|
| | rate are provided. An optional automatic starter based on flow depth is also available. |
| Power Source: | 115 VAC, 12 VDC auto battery, or internal NiCad or sealed lead-acid battery. |
| Sample Refrigerator: | Has ice cavity for cooling; will maintain samples up to 22°C (40°F) below ambient for at least 24 hours. |
| Construction Materials: | All plastic construction including insulated case, tubing, and sample bottles; stainless steel hardware. |
| Basic Dimensions: | 49.5 cm (19.5 in.) diameter x 53 cm (21 in.)H; weighs 18.1 kg (40 lbs); portable. |
| Base Price: | $1,095; add $130 for NiCad or $50 for lead-acid batteries, $100 for multiplexer, $22 for optional timers. Glass bottle version is $1,121. Model 1640 automatic starter is $125. |
| General Comments: | Sampler will withstand accidental submersion for short periods of time. All electrical and mechanical components are waterproofed; the programming unit is sealed in a water-tight housing that contains a regeneratable dessicant. Manufacturer claims peristaltic pump tubing can fill more than 80,000 sample bottles before requiring replacement. At least 100-460 mℓ samples may be taken on a single 18-hour battery charge. A rotating "clog-proof" funnel delivers samples to the distributer plate which channels them to their individual bottles. After each sample the pump automatically reverses itself to purge intake tube and minimize cross-contamination. Operator may manually trigger unit for individual test sample or purge at any stage of operation. |

ISCO Model 1392 Evaluation

1. Strainer could be vulnerable unless oriented properly; the unobstructed 0.64 cm (1/4 in.) inside diameter sampling line, peristaltic pump, and "non-clog" funnel should pass small solids without difficulty.

2. Obstruction of flow will depend upon user mounting of intake.

3. Should operate reasonably well under all flow conditions.

4. Movement of solids within the fluid flow should not affect operation adversely.

5. Optional automatic starter actuates sampling cycle when flow depth reaches a preset value. Backflushing after taking each sample provides a self-cleaning function of sorts.

6. Unit collects up to 28 discrete samples (or sequential composites with optional multiplexer) or a large single composite. Can be paced by either built-in timer or external flowmeter.

7. Unit does not appear suitable for collection of floatables or coarser bottom solids.

8. Unit affords good sample protection; insulated case has ice cavity which will keep samples up to 22°C (40°F) below ambient for 24 hours.

9. Unit comes with a harness for suspending it in manholes.

10. Unit can withstand total immersion for short periods of time.

11. Unit would not appear to function well after prolonged exposure to freezing ambients.

12. Unit should be able to sample over a wide range of operating head conditions.

| | |
|---|---|
| Designation: | ISCO MODEL 1480 |
| Manufacturer: | Instrumentation Specialties Co.<br>Environmental Division<br>P.O. Box 5347<br>Lincoln, Nebraska 68505<br>Phone (402) 799-2441 |
| Sampler Intake: | Weighted plastic cylindrical strainer with four rows of five 0.3 cm (1/8 in.) holes evenly spaced around its periphery. |
| Gathering Method: | Suction lift from peristaltic pump. |
| Sample Lift: | 7.9m (26 ft) maximum lift. |
| Line Size: | 0.64 cm (1/4 in.) I.D. |
| Sample Flow Rate: | Not applicable. |
| Sample Capacity: | Uniform aliquots of about 7 mℓ are composited in a 11.4ℓ (3 gal) container (standard) or 18.9ℓ (5 gal) container (optional). The base itself can be used to collect 38ℓ (10 gal) samples and can be replaced by a 57ℓ (15 gal) polyolefin barrel for larger sample requirements. |
| Controls: | Solid state electronics allow sample collection rate to be varied continuously from 0.2 liters per day to 10.4 liters per hour in timed mode; may also be paced by ISCO Model 1470 flowmeter. Optional automatic starter also available. |
| Power Source: | 115 VAC, 12 VDC auto battery, or internal NiCad or sealed lead-acid battery. |
| Sample Refrigerator: | Base has 2.5 cm (1 in.) foamed-in-place insulation and ice cavity |

| | |
|---|---|
| | that will keep a 11.4ℓ (3 gal) sample below 13°C (55°F) for over 24 hours in a 56°C (100°F) environment. |
| Construction Materials: | All plastic construction including insulated case, tubing, and sample container; stainless steel hardware. |
| Basic Dimensions: | 48 cm (19 in.) diameter x 65 cm (25.5 in.) H; weighs 14 kg (31 lbs); portable. |
| Base Price: | $645; $130 for NiCad or $50 for lead-acid battery; Model 1640 automatic starter is $125. |
| General Comments: | Sampler will withstand accidental submersion for short periods of time. All electrical and mechanical components are waterproofed; the programming unit is sealed in a water-tight housing that contains a regenerable dessicant. Model 1480 is not designed to provide true proportions of heavy suspended solids due to its intermittent pumping action. The peristaltic pump turns in one-half revolution increments with two rollers pinching the tubing at the end of each movement so that the sample will not drain back through the intake.<br><br>The optional Model 1470 flowmeter enables the sampler to collect a composite based on the volume of passing fluid rather than on time. Flowmeters other than ISCO are not suited for use with the Model 1480 sampler. Up to 151ℓ (40 gal) of sample may be taken on an 18 hour battery charge. |

ISCO Model 1480 Evaluation

1. Strainer could be vulnerable unless oriented properly; the unobstructed 0.64 cm (1/4 in.) inside diameter sampling line allows the passage of solids, but the intermittent pumping action is not likely to gather anything large enough to clog unit.

2. Obstruction of flow will depend upon user mounting of intake.

3. Should operate reasonably well under most flow conditions, but unit is not recommended by manufacturer and should not be used in flows with any appreciable amount of heavy suspended solids, even at low flow rates.

4. Movement of solids within the fluid flow should not affect operation adversely.

5. Optional automatic starter; no self-cleaning features; cross-contamination appears very likely.

6. Collects fixed size aliquots paced by either a built-in timer or external flowmeter and composites them in a suitable container.

7. Unit does not appear suitable for collection of coarser bottom solids or floatables.

8. Unit affords good sample protection; insulated case has ice cavity which will keep a 11.4ℓ (3 gal) sample below 13°C (55°F) for over 24 hours in a 56°C (100°F) environment.

9. Unit comes with harness for suspending it in manholes.

10. Unit can withstand total immersion for short periods of time.

11. Unit cannot withstand freezing temperatures.

12. Unit should be able to sample over a wide range of operating head conditions.

| | |
|---|---|
| Designation: | ISCO MODEL 1580 |
| Manufacturer: | Instrumentation Specialties Company<br>*Environmental Division*<br>P.O. Box 5347<br>Lincoln, Nebraska 68505<br>Phone (402) 799-2441 |
| Sampler Intake: | Weighted plastic cylindrical strainer with four rows of five 0.3 cm (1/8 in.) holes evenly spaced around its periphery. |
| Gathering Method: | Suction lift from peristaltic pump. |
| Sample Lift: | 7.9m (26 ft) maximum lift. |
| Line Size: | 0.64 cm (1/4 in.) I.D. |
| Sample Flow Rate: | Up to 1.4 ℓpm (0.37 gpm) depending upon lift. |
| Sample Capacity: | Adjustable size aliquots (between 40 and 600 mℓ) are composited in a 11.4ℓ (3 gal) container (standard) or 18.9ℓ (5 gal) container (optional). The base itself can be used to collect 38ℓ (10 gal) samples and can be replaced by a 57ℓ (15 gal) polyolefin barrel for larger sample requirements. |
| Controls: | Sample aliquot size is switch selectable in eight increments from 40 to 600 mℓ; sampling frequency can be adjusted from 2.5 to 320 minutes when operating in the timed mode. A switch multiplies the volume that is transmitted by an external flowmeter by a factor of from 1 to 9 when used in the flow mode. Any flowmeter that provides a contact closure at fixed volumetric intervals can be used. |

| | |
|---|---|
| Power Source: | 115 VAC, 12 VDC auto battery, or internal NiCad or sealed lead-acid battery. |
| Sample Refrigerator: | Base has 2.5 cm (1 in.) foamed-in-place insulation and ice cavity that will keep a 11.4ℓ (3 gal) sample below 13°C (55°F) for over 24 hours in a 56°C (100°F) environment. |
| Construction Materials: | All plastic construction including insulated case, tubing, and sample container; stainless steel hardware. |
| Basic Dimensions: | 48 cm (19 in.) diameter x 65 cm (25.5 in.) H; weighs 14 kg (31 lbs); portable. |
| Base Price: | $750; $130 for NiCad or $50 for lead-acid battery; Model 1640 automatic starter is $125. |
| General Comments: | Sampler will withstand accidental submersion for short periods of time. All electrical and mechanical components are waterproofed; the programming unit is sealed in a water-tight housing that contains a regenerable dessicant. The intake line is purged before and after each aliquot is taken to help minimize cross-contamination and ensure that the sample is representative of the time at which it was taken. The optional automatic starter allows the unit to be activated when the flow depth reaches some predetermined level. |

ISCO Model 1580 Evaluation

1. Strainer could be vulnerable unless oriented properly; the unobstructed 0.64 cm (1/4 in.) inside diameter sampling line and peristaltic pump should pass small solids without difficulty.

2. Obstruction to flow will depend upon user mounting of intake.

3. Should operate reasonably well under all flow conditions.

4. Movement of solids within the fluid flow should not affect operation adversely.

5. Optional automatic starter; purging before and after each aliquot is taken provides a self-cleaning action of sorts and should help minimize cross-contamination.

6. Collects predetermined size aliquots paced by either a built-in timer or external flowmeter and composites them in a suitable container.

7. Unit does not appear suitable for collection of coarser bottom solids or floatables.

8. Unit affords good sample protection; insulated case has ice cavity which will keep a 11.4ℓ (3 gal) sample below 13°C (55°F) for over 24 hours in a 56°C (100°F) environment.

9. Unit comes with harness for suspending it in manholes.

10. Unit can withstand total immersion for short periods of time.

11. Unit would not appear to function well after prolonged exposure to freezing ambients.

12. Unit should be able to sample over a wide range of operating head conditions.

| | |
|---|---|
| Designation: | KENT MODEL SSA |
| Manufacturer: | Kent Cambridge Instrument Company<br>73 Spring Street<br>Ossining, New York 10562<br>Phone (914) 941-8100 |
| Sampler Intake: | Plastic strainer at end of 7.6m (25 ft) suction tube. |
| Gathering Method: | Suction lift from peristaltic pump. |
| Sample Lift: | Up to 4.9m (16 ft). |
| Line Size: | 0.6 cm (1/4 in.) I.D. |
| Sample Flow Rate: | Up to 150 mℓ per minute depending upon lift. |
| Sample Capacity: | Collects 24 discrete samples of up to 177 (or 473) mℓ over a period of 6, 12, or 24 hours. |
| Controls: | Spring-driven clock triggers unit at one hour intervals; other timing mechanisms are available to allow a sample to be taken at 15 or 30 minute intervals. Sample volume is determined by forward pump run time which is adjustable to compensate for lift and flow depth. |
| Power Source: | 12 VDC lead-acid battery, 115 VAC or 220 VAC. |
| Sample Refrigerator: | None. |
| Construction Materials: | Sampling train is all plastic; totally enclosing glass reinforced plastic case available. |
| Basic Dimensions: | 45.7 cm (18 in.) diameter by 40.6 cm (16 in.) H; weighs 24.4 kg (54 lbs); portable. |

| | |
|---|---|
| Base Price: | $1,240. |
| General Comments: | On signal, pump starts and runs in reverse to clear tubing of fluid, then runs forward for a pre-set time to deliver sample to container, after which it again reverses to purge pump and tubing of fluid. A complete cycle takes from 2 to 5 minutes depending upon lift and the quantity of sample desired. |

Kent Model SSA Evaluation

1. Peristaltic action of pump should reduce probability of clogging.
2. Obstruction of flow will depend upon way user mounts intake.
3. Should operate reasonably well under all flow conditions, but fairly low intake velocity could affect representativeness of sample at high flow rates.
4. Movement of solids should not hamper operation.
5. No automatic starter. At start of each cycle pump operates in reverse to clear line of previous sample to help minimize cross-contamination and offer a sort of self cleaning.
6. Unit collects 24 discrete samples at preset time intervals. Representativeness of sample will depend upon user mounting of intake tube.
7. Unit does not appear suitable for collection of floatables or coarser bottom solids.
8. No refrigeration. Reasonably good sample protection. Cross-contamination should be small.
9. Designed to operate in manhole environment.
10. Cannot withstand total immersion.
11. Not suited for operation in freezing ambients.
12. Maximum lift of 4.9m (16 ft) places some restriction on use of unit.

| | |
|---|---|
| Designation: | KENT MODEL SSB |
| Manufacturer: | Kent Cambridge Instrument Company<br>73 Spring Street<br>Ossining, New York 10562<br>Phone (914) 941-8100 |
| Sampler Intake: | Fine gauze filter at end of suction tube. |
| Gathering Method: | Suction lift from peristaltic pump. |
| Sample Lift: | Up to 4m (13 ft). |
| Line Size: | 0.6 cm (1/4 in.) I.D. |
| Sample Flow Rate: | Less than 200 mℓ per minute depending upon lift. |
| Sample Capacity: | Collects aliquots of pre-set size and either composites them hourly (standard, 30 and 15 minute intervals optional) in one of 24 discrete 500 mℓ containers or in a single 20ℓ bottle. |
| Controls: | Rheostat on continuously running pump motor controls speed which, together with lift and a 0-60 second diverter timer, determines aliquot size. In the 24 bottle version, the bottles are mounted on a rotating turntable that indexes hourly (standard, 30, or 15 minute intervals optional). Aliquot interval is either controlled by an external flowmeter (rate or totalized signal) or by an adjustable interval timer. |
| Power Source: | 115 VAC; 240 VAC. |
| Sample Refrigerator: | None. |
| Construction Materials: | Sampling train is plastic except for diverter which may be stainless steel; cabinet is sheet metal. |

| | |
|---|---|
| Basic Dimensions: | 38 x 38 x 87 cm (15x15x34 in.); weighs 30 kg (66 lbs); designed for fixed installation. |
| Base Price: | $2,354. |
| General Comments: | Unit is not recommended for flows that are high in suspended solids. In operation, the discharge from the continuously running pump is directed to a tippler mechanism that normally returns the flow to waste downstream from the intake. On signal the tippler mechanism diverts the flow to the sample discharge line for a predetermined time period. Manufacturer recommends changing pump tubing every two weeks and "regular" cleaning of the tippler mechanism. |

Kent Model SSB Evaluation

1. Peristaltic action of pump and gauze filter should reduce probability of clogging.

2. Obstruction of flow will depend upon way user mounts intake.

3. Should operate reasonably well under all flow conditions, but fairly low intake velocity could affect representativeness of sample at high flow rates.

4. Movement of solids should not hamper operation.

5. No automatic starter. Continuous flow will offer a sort of self cleaning. The 24 bottle unit would appear very difficult to clean in the field.

6. Unit collects either 24 sequential composite samples made up of a number of individual aliquots or a single composite sample as paced by either an external flowmeter or by an internal timer. Representativeness of sample will depend upon user mounting of intake tube.

7. Unit does not appear suitable for collection of floatables or coarser bottom solids.

8. No refrigeration. Reasonably good sample protection. Cross-contamination appears likely.

9. Not designed to operate in manhole environment.

10. Cannot withstand total immersion.

11. Not suited for operation in freezing ambients.

12. Maximum lift of 4m (13 ft) places some restriction on use of unit.

| | |
|---|---|
| Designation: | KENT MODEL SSC |
| Manufacturer: | Kent Cambridge Instrument Company<br>73 Spring Street<br>Ossining, New York 10562<br>Phone (914) 941-8100 |
| Sample Intake: | Fine strainer at end of suction tube which must be immersed at least 5 cm (2 in.) below the surface of the liquid to prevent pump from drawing air. |
| Gathering Method: | Suction lift from progressive cavity screw-type pump. |
| Sample Lift: | Up to 5m (16.4 ft). |
| Line Size: | 2.5 cm (1 in.) I.D. |
| Sample Flow Rate: | Up to 33 ℓpm depending upon lift. |
| Sample Capacity: | Collects either 24 discrete 280 mℓ samples or a 20ℓ composite sample. |
| Controls: | Sample interval is either controlled by external flowmeter or fixed at 15, 30, or 60 minutes by interval timer. A 0-300 second delay timer is used to control pump running time to assure that a full 280 mℓ aliquot is taken. |
| Power Source: | 115 VAC; 240 VAC. |
| Sample Refrigerator: | None. |
| Construction Materials: | Sampling train is rubber, plastic, and stainless steel. |
| Basic Dimensions: | 76 x 125 x 81 cm (30x49x32 in.); weighs 80 kg (176 lbs); designed for fixed installation. |
| Base Price: | $2,354. |

General Comments: On signal, the pump starts and its discharge is directed to a tipping bucket, the force of the jet being sufficient to hold the tippler in an upright position so that its overflow discharges back into the flow stream. After a preset time the pump stops and the weight of the sample in the tippler causes it to overbalance and discharge its contents into the sample container. In the 24 bottle version, the turntable carrying the bottles then rotates to present a fresh container for the next sample. The unit must be mounted adjacent to the channel from which the samples are to be taken with the tippler overflow directed back into the channel. The pump must be primed with water upon installation or at any time when it does not contain residual effluence. Manufacturer states that tippler mechanism must be cleaned regularly.

Kent Model SSC Evaluation

1. Should be relatively free from clogging due to large line size; Moyno pump will handle suspended solids.

2. Obstruction of flow will depend upon way user mounts intake.

3. Should operate well over the entire range of flow conditions.

4. Movement of solids should not hamper operation.

5. No automatic starter. No self-cleaning function.

6. Can collect external flowmeter or built-in timer paced samples-either sequential or composite. Representativeness of sample will depend in part upon user mounting of intake tube. Decanting tippler

design could lead to artificial enhancement of suspended solids.

7. Unsuitable for collection of floatables or coarser bottom solids without specially designed intake by user.

8. No refrigeration. Fair sample protection. Cross-contamination appears likely.

9. Not well suited for confined space or manhole operation.

10. Cannot withstand total immersion.

11. Not suited for operation in freezing ambients.

12. Maximum lift of 5m (16.4 ft) and necessity for mounting adjacent to flow stream place restrictions on use of unit.

| | |
|---|---|
| Designation: | LAKESIDE TREBLER MODEL T-2 |
| Manufacturer: | Lakeside Equipment Corporation<br>1022 East Devon Avenue<br>Bartlett, Illinois 60103<br>Phone (312) 837-5640 |
| Sampler Intake: | Specially designed scoop. |
| Gathering Method: | Mechanical; rotating scoop traverses entire depth of flow; as scoop is rotated out of flow the sample drains by gravity through the hub and into a composite sample jar. |
| Sample Lift: | Unit must be in flow stream. |
| Line Size: | 1.3 cm (1/2 in.) diameter pipe connects hub to sample container. |
| Sample Flow Rate: | Not applicable. |
| Sample Capacity: | Scoop is shaped to gather a volume of sample that is proportional to the channel flow; can vary typically from 300 to 600 mℓ when installed in a Parshall flume. |
| Controls: | Timer can be used to trigger sampling cycle at any desired interval of a 1 hour period. |
| Power Source: | 115 VAC electricity. |
| Sample Refrigerator: | Automatic refrigerator available which maintains sample temperature at approximately 4°C. |
| Construction Materials: | Cast aluminum frame, steel sprockets and chain drive, plexiglass or cast aluminum scoop, plastic pipe, polyethylene sample bottle. |
| Basic Dimensions: | Approximately 0.6-0.9m (2-3 ft) of head room above flume is required. Other dimensions depend upon size of flume. Refrigerator case is 76 x 61 x 91 cm (30 x 24 x 36 in.). Fixed installation. |

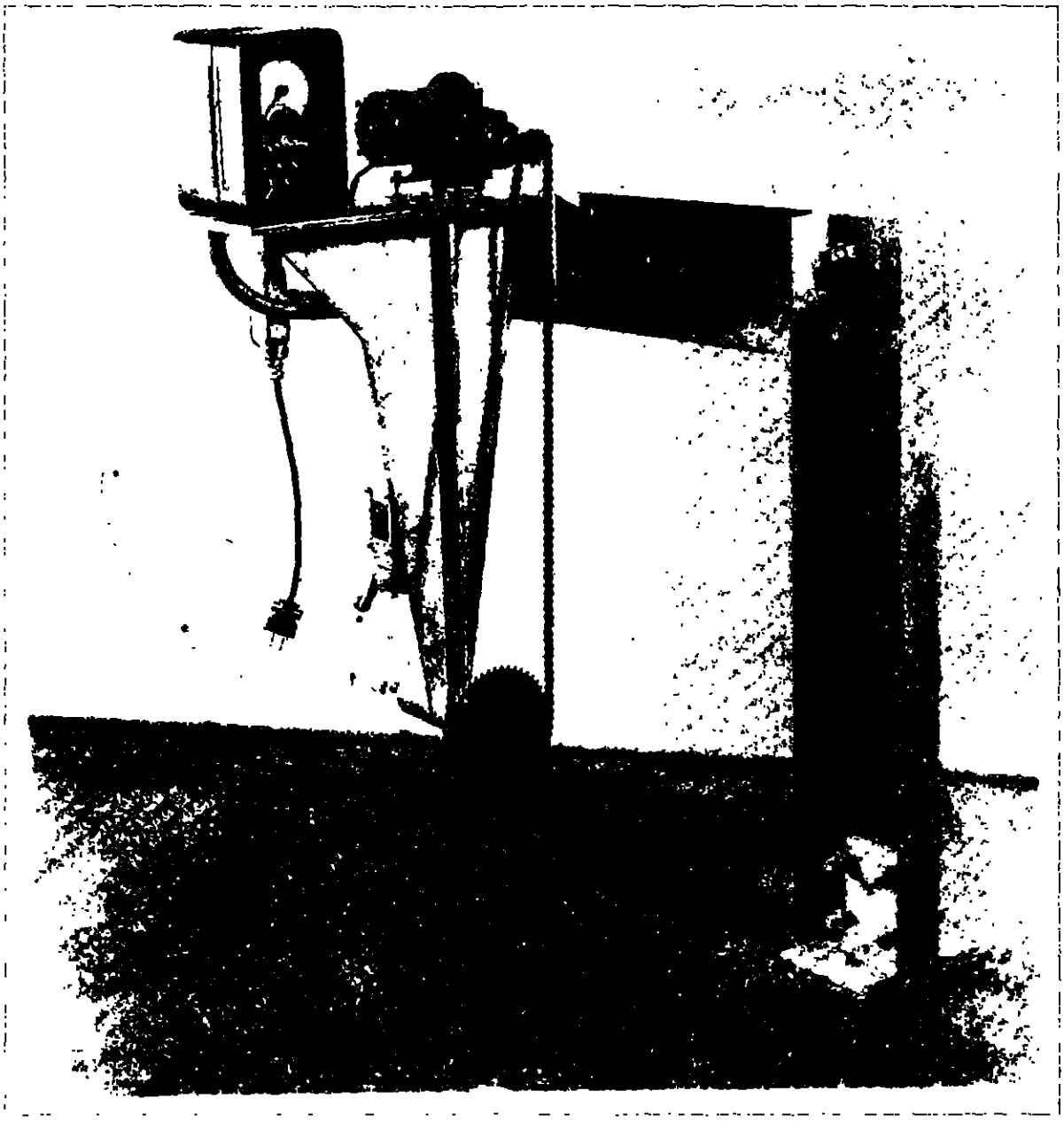


Figure 8. Lakeside Trebler Model T-2 Sampler

Photograph courtesy of Lakeside Equipment Corp.

| | |
|---|---|
| Base Price: | $688 with plexiglass scoop.<br>$962 with timer.<br>Add $615 for refrigerator. |
| General Comments: | Without timer the unit takes 30 samples per hour. For accurate sampling the unit must operate in conjunction with a Parshall flume or weir. For raw sewage or industrial wastes with high settleable solids count a Parshall flume is recommended. Daily inspection and weekly cleaning is recommended. |

Lakeside Trebler Model T-2 Evaluation

1. Scoop is not likely to pick up any solids large enough to clog sample line.

2. Scoop presents an obstruction over the entire depth of flow during sampling cycle.

3. Scoop must be designed for range of flows anticipated in conjunction with flume. This range has certain limitations.

4. Movement of solids could interfere with scoop rotation; abrasive wear on plexiglass scoop could be high.

5. No automatic starter; no self cleaning features.

6. Collects a sample for compositing from throughout the entire depth of flow that is proportional to depth and hence flow rate through the flume.

7. Will afford some capability of sampling floatables as well as bottom solids.

8. Standard unit has no sample container. Optional refrigerator would appear to offer reasonable protection.

9. Designed for operation in the flow stream but requires a Parshall flume for best operation which would rule out most manholes.

10. Unit cannot withstand total immersion.

11. Unit is not designed to operate in freezing ambients.

12. Unit must be in flow stream to function.

| | |
|---|---|
| Designation: | MANNING MODEL S4000 |
| Manufacturer: | Manning Environmental Corporation<br>120 DuBois Street<br>P.O. Box 1356<br>Santa Cruz, California 98061<br>Phone (408) 427-0230 |
| Sampler Intake: | Weighted intake at end of 6.7m (22 ft) sampling tube installed to suit by user. |
| Gathering Method: | Section lift by vacuum pump. |
| Sample Lift: | Up to 6.7m (22 ft). |
| Line Size: | 0.95 cm (3/8 in.) I.D. |
| Sample Flow Rate: | Up to 3.8 ℓpm (1 gpm) depending upon lift. |
| Sample Capacity: | Standard unit takes 24 discrete samples adjustable in size between 50 and 500 mℓ. Options allow for collecting sequential composite samples made up of up to 5 aliquots each or for filling up to 4 bottles in immediate succession. |
| Controls: | Unit may be paced by the contact closure output of an external flowmeter or by an optional internal quartz crystal timer whose interval can be set at 15 or 30 minutes or 1, 2, 3, 4, 6, 8, 12 or 24 hours. Sample size is adjustable (±20 mℓ) by positioning end of syphon in metering chamber. Optional features allow sampler to be switch selectable to take multiple samples in one bottle or the same sample in multiple bottles. There are manual controls for bottle advance and for one complete test cycle. |
| Power Source: | 12 VDC non-spillable wet-cell battery. |

| | |
|---|---|
| Sample Refrigerator: | An ice compartment is provided in the base to facilitate sample cooling. |
| Construction Materials: | Sampling train is all plastic except for intake; case is molded plastic with stainless steel hardware. |
| Basic Dimensions: | 48 cm (19 in.) diameter x 57 cm (22.5 in.) H; weighs 16 kg (35 lbs); portable. |
| Base Price: | $1,290. |
| General Comments: | Sampler may be manually started or actuated by an external device such as a liquid level or rain gage. Cycle begins with compressor purging metering chamber and intake line with air for 15 seconds. A solenoid valve then inverts the compressor lines to create a vacuum in the metering chamber and liquid is drawn up until it is full as detected by an electronic sensor. The solenoid valve then reverses and the metering chamber is again pressurized forcing the excess sample back out the intake hose. A pinch valve opens, permitting the premeasured sample remaining to be forced into the sample bottle, and then closes, permitting purge to continue for 10 seconds. Unit automatically recycles through purge twice, if required. |

Manning Model S4000 Evaluation

1. Should be fairly free from clogging due to lack of bends in sample train and high pressure purging feature.

2. Obstruction of flow will depend upon user mounting of intake.

3. Should operate well over the entire range of flow conditions.

4. Movement of solids should not hamper operation.

5. Automatic starter available. Power purge serves a self-cleaning function. Cross-contamination should be minimal.

6. Collects external flowmeter or internal timer paced samples and deposits them in individual containers one at a time or collectively in multiple groups (optional). Sample representativeness will depend upon user mounting of intake.

7. Unsuitable for collection of floatables or coarser bottom solids without specially designed intake by user.

8. Unit affords good sample protection; insulated case has ice cavity which will provide cooling for a limited time. High pressure purge should offer reasonable protection against cross-contamination.

9. Designed to operate in manhole area.

10. Unit appears capable of withstanding accidental, short-time submersion.

11. Unit would not appear to function well after prolonged exposure to freezing ambients.

12. Maximum lift of 6.7m (22 ft) does not place too severe a restriction on use of the unit.

| | |
|---|---|
| Designation: | MARKLAND MODEL 1301 |
| Manufacturer: | Markland Specialty Engineering Ltd.<br>Box 145<br>Etobicoke, Ontario (Canada)<br>Phone (416) 625-0930 |
| Sampler Intake: | Small gravity filled sample chamber equipped with patented non-clogging "duckbill" inlet control. |
| Gathering Method: | Forced flow due to pneumatic ejection. |
| Sample Lift: | 18.3m (60 ft) standard. |
| Line Size: | 0.64 cm (1/4 in.) I.D. |
| Sample Flow Rate: | Varies with pressure and lift. |
| Sample Capacity: | Composites 75-mℓ aliquots into a 7.6ℓ (2 gal) bottle. |
| Controls: | Solid state clock allows selecting intervals between aliquots of 15 to 60 minutes. Optional controller allows pacing from external flowmeter. |
| Power Source: | Compressed air bottle plus two 6-volt, dry-cell lantern batteries. |
| Sample Refrigerator: | None |
| Construction Materials: | Standard intake housing is aluminum alloy; stainless steel and PVC are available as alternates. Standard "duckbill" is EPT; Buna-N and Viton are available. Tygon tubing, stainless steel or plastic fittings, polyethylene sample bottle, fiberglass case. |
| Basic Dimensions: | Sample intake is 7.3 cm (2.875 in.) diameter x 12.7 cm (5 in.) H; case is 43 x 30 x 71 cm (17x12x 28 in.); weighs 27.2 kg (60 lbs); portable. |

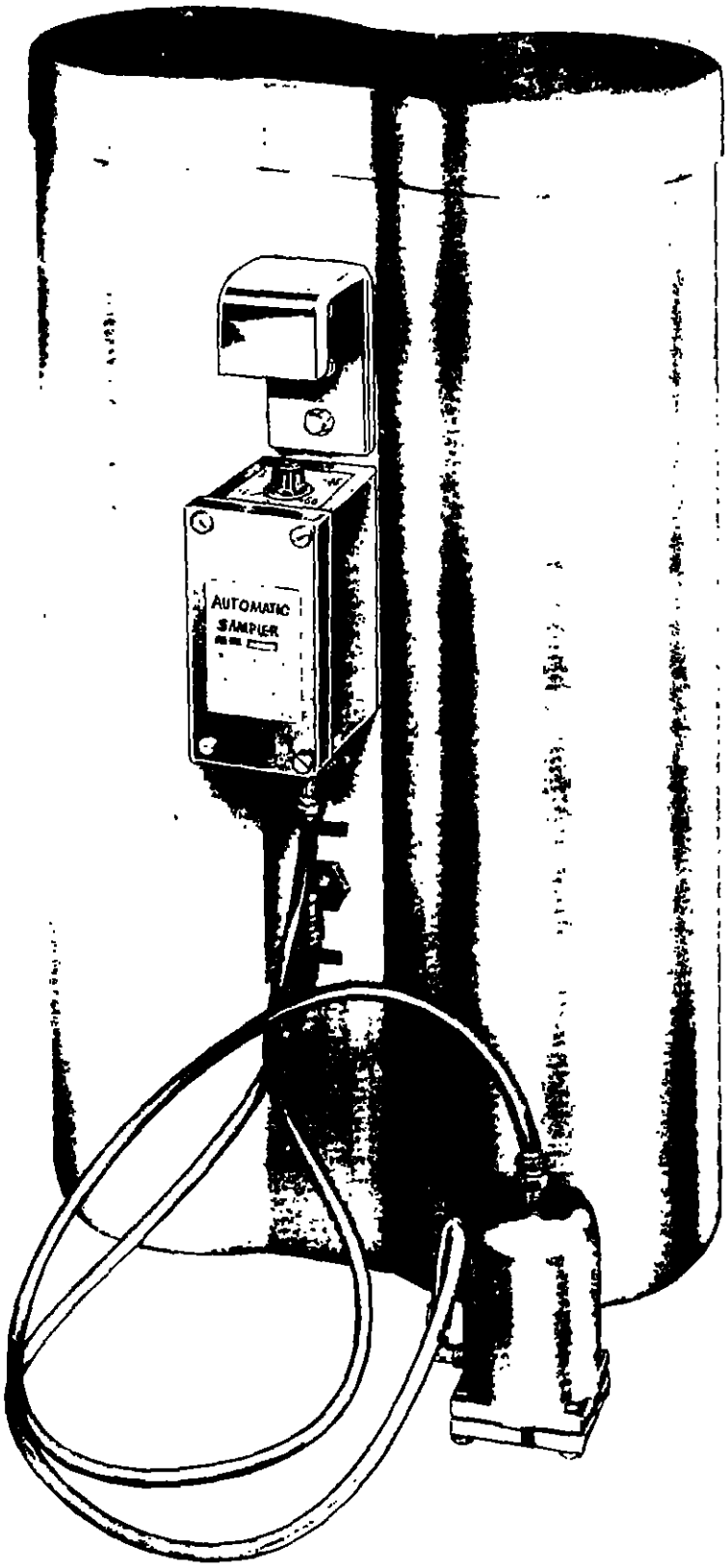



Figure 9. Markland Model 1301 Portable Sampler

Illustration Courtesy of Markland Specialty Ltd.

Base Price: $1095; add $135 for stainless steel or PVC intake, $20 for Viton "duckbill", $100 for flow proportional adapter; all prices include air freight and duty.

General Comments: The heart of the sampler is the patented rubber "duckbill" in the sample intake housing. It is round on the bottom and flattens out to a flaired top where the opening is simply a slit. When the intake is vented to atmosphere, the hydrostatic liquid head forces a sample up through the vertical inlet and through the "duckbill" slit, which acts like a screen (the lips can only open a limited amount), until the pressure is equalized. When air pressure is applied to raise the sample the "duckbill" lips close (acting as a check valve), and the squeezing-shut progresses downwards toward the bottom inlet expelling ahead (in a sort of milking action) any contained solids which fall back into the stream due to gravity.

Markland Model 1301 Evaluation

1. Sampler intake should be free from clogging; "duckbill" will not pass any solids large enough to clog sample line; relatively high discharge pressure will also help prevent clogging.

2. Sampler intake presents a rigid obstruction to the flow.

3. Sampling chamber will fill immediately following discharge of previous aliquot, resulting in a sample not necessarily representative of conditions in the sewer at the time of the next triggering signal. Representativeness is also questionable at high flow rates.

4. Movement of large objects in the flow could damage or even physically destroy the sampler intake.

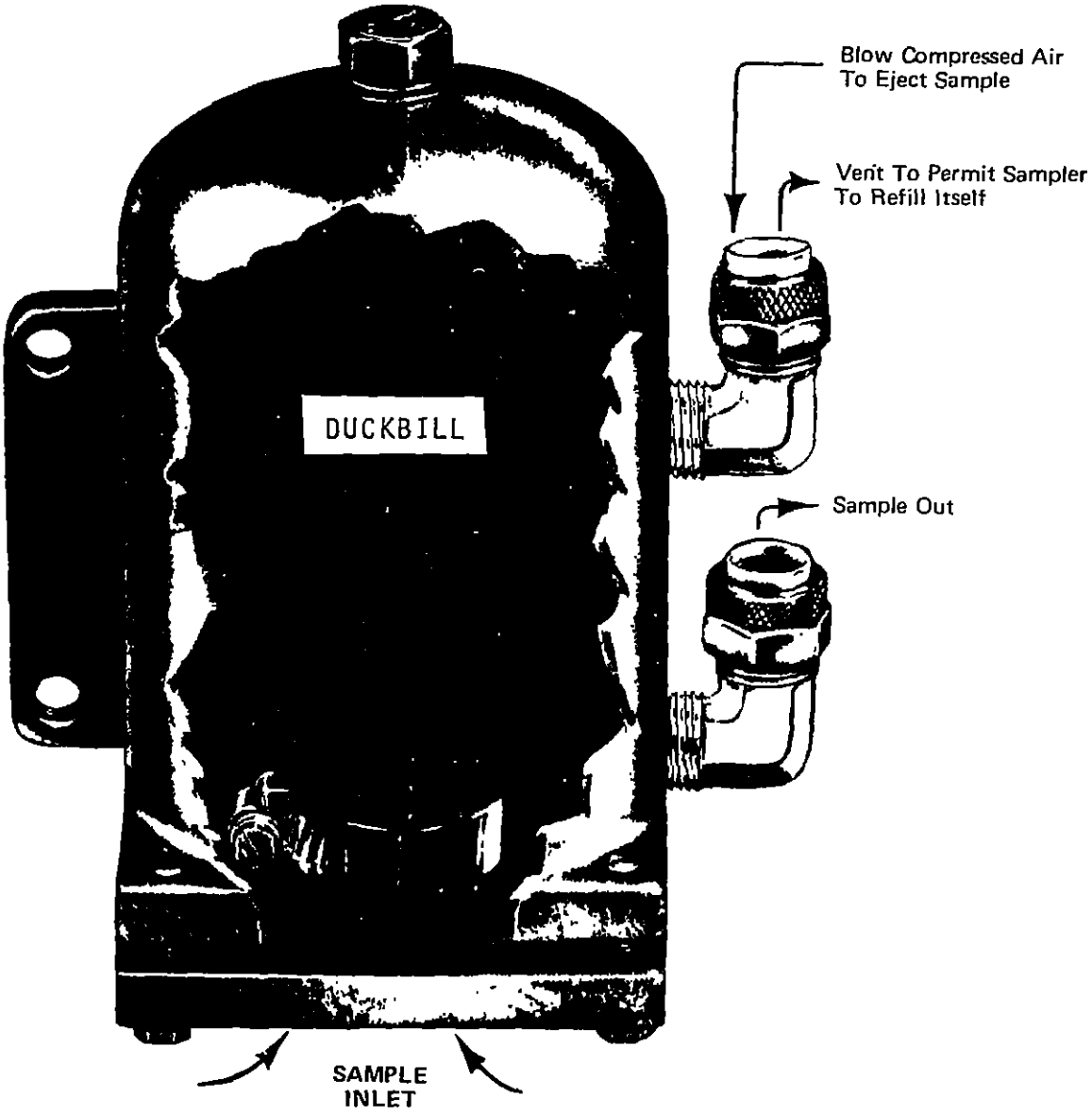



Figure 10. Markland "Duckbill" Sampler Intake

Illustration Courtesy of Markland Specialty Engineering Ltd.

5. Unit has automatic starter but no self-cleaning features.

6. Collects spot samples at either preset time intervals or paced by an external flowmeter and composites them in a suitable container.

7. Appears unsuitable for collection of either floatable materials or coarser bottom solids.

8. No refrigeration is provided. Cross-contamination appears likely.

9. Unit is designed for manhole operation.

10. Cannot withstand total immersion.

11. Should be able to operate in freezing ambients for some period of time.

12. With a fully charged gas bottle, lifts in excess of 18.3m (60 ft) should be obtainable, putting very little restriction on operating head conditions.

| | |
|---|---|
| Designation: | MARKLAND MODEL 101 |
| Manufacturer: | Markland Specialty Engineering Ltd.<br>Box 145<br>Etobicoke, Ontario (Canada)<br>Phone (416) 625-0930 |
| Sampler Intake: | Small gravity filled sample chamber equipped with patented non-clogging "duckbill" inlet control. |
| Gathering Method: | Forced flow due to pneumatic ejection. |
| Sample Lift: | 18.3m (60 ft) standard. |
| Line Size: | 0.64 cm (1/4 in.) I.D. |
| Sample Flow Rate: | Varies with pressure and lift. |
| Sample Capacity: | Composites 75-mℓ aliquots into a 7.6ℓ (2 gal) bottle. |
| Controls: | A cycle timer with field adjustable cams allows taking an aliquot every 10, 15, 20, 30, or 60 minutes. |
| Power Source: | Plant air for Model 101; Model 2101 includes air compressor and motor; 110 VAC. |
| Sample Refrigerator: | 0.17 cu m (6 cu ft) automatic refrigerator to hold either a 7.6 or 18.9ℓ (2 or 5 gal) bottle available. |
| Construction Materials: | Standard intake housing is aluminum alloy; stainless steel and PVC are available as alternates. Standard "duckbill" is EPT; Buna-N and Viton are available. Tygon tubing, stainless steel or plastic fittings, polyethylene sample bottle. |

Basic Dimensions: Sample intake is 7.3 cm (2.875 in.) diameter x 12.7 cm (5 in.) H; wall-mounted control box is 15 x 10 x 15 cm (6x4x6 in.); fixed installation.

Base Price: $594 for Model 101 including control box, remote sampling intake, air filter, regulator and pressure gauge, 100 feet of tubing, and 2 gallon sample collection bottle; $634 for Model 2101 including control box, remote sampling intake, air compressor and motor, 100 feet of tubing, and 2 gallon sample collection bottle; add $135 for stainless steel or PVC intake, $20 for Viton "duckbill", $335 for refrigerator, $11 for 5 gallon sample container; all prices include air freight and duty. Model 300 discrete 24 bottle attachment is $795.

General Comments: The heart of the sampler is the patented rubber "duckbill" in the sample intake housing. It is round on the bottom and flattens out to a flaired top where the opening is simply a slit. When the intake is vented to atmosphere, the hydrostatic liquid head forces a sample up through the "duckbill" slit, which acts like a screen (the lips can only open a limited amount), until the pressure is equalized. When air pressure is applied to raise the sample, the "duckbill" lips close (acting as a check valve), and the squeezing-shut progresses downwards toward the bottom inlet expelling ahead (in a sort of milking action) any contained solids which fall back into the stream due to gravity.

Markland Model 101 Evaluation

1. Sampler intake should be free from clogging; "duck-bill" will not pass any solids large enough to clog sample line; relatively high discharge pressure will also help prevent clogging.

2. Sampler intake presents a rigid obstruction to the flow.

3. Sampling chamber will fill immediately following discharge of previous aliquot, resulting in a sample not necessarily representative of conditions in the sewer at the time of the next triggering signal. Representativeness is also questionable at high flow rates.

4. Movement of large objects in the flow could damage or even physically destroy the sampler intake.

5. Has no automatic start or self-cleaning features.

6. Collects spot samples at preset time intervals and composites them in a suitable container.

7. Appears unsuitable for collection of either floatable materials or coarser bottom solids.

8. Automatic refrigeration is available as an option. Cross-contamination appears likely.

9. Unit is not designed for manhole operation.

10. Cannot withstand total immersion.

11. Should be able to operate in freezing ambients for some period of time.

12. Lifts in excess of 18.3m (60 ft) should be obtainable, putting very little restriction on operating head conditions.

| | |
|---|---|
| Designation: | MARKLAND MODEL 102 |
| Manufacturer: | Markland Specialty Engineering Ltd.<br>Box 145<br>Etobicoke, Ontario (Canada)<br>Phone (416) 625-0930 |
| Sampler Intake: | Small gravity filled sample chamber equipped with patented non-clogging "duckbill" inlet control. |
| Gathering Method: | Forced flow due to pneumatic ejection. |
| Sample Lift: | 18.3m (60 ft) standard. |
| Line Size: | 0.64 cm (1/4 in.) I.D. |
| Sample Flow Rate: | Varies with pressure and lift. |
| Sample Capacity: | Composites 75-mℓ aliquots into a 7.6ℓ (2 gal) bottle. |
| Controls: | A cycle timer with field adjustable cams allows taking an aliquot every 10, 15, 20, 30, or 60 minutes. |
| Power Source: | Plant air plus 110 VAC. |
| Sample Refrigerator: | 0.17 cu m (6 cu ft) automatic refrigerator to hold either a 7.6 or 18.9ℓ (2 or 5 gal) bottle available. |
| Construction Materials: | Standard intake housing is aluminum alloy; stainless steel and PVC are available as alternates. Standard "duckbill" is EPT; Buna-N and Viton are available. Tygon tubing, stainless steel or plastic fittings, polyethylene sample bottle, fiberglass case. |
| Basic Dimensions: | Sample intake is 7.3 cm (2.875 in.) diameter x 12.7 cm (5 in.) H; wall-mounted control box is 25 x 13 x 30 cm (10x5x12 in.); fixed installation. |

Base Price: $894, Includes control box, remote sampling intake, air filter, regulator and pressure gauge, 100 feet of tubing, and 2 gallon sample collection bottle. Add $135 for stainless steel or PVC intake, $20 for Viton "duckbill", $325 for refrigerator, $10 for 5 gallon sample container. All prices include air freight and duty. Model 300 discrete 24 bottle attachment is $795.

General Comments: The heart of the sampler is the patented rubber "duckbill" in the sample intake housing. It is round on the bottom and flattens out to a flaired top where the opening is simply a slit. When the intake is vented to atmosphere, the hydrostatic liquid head forces a sample up through the vertical inlet and through the "duckbill" slit, which acts like a screen (the lips can only open a limited amount), until the pressure is equalized. When air pressure is applied to raise the sample the "duckbill" lips close (acting as a check valve), and the squeezing-shut progresses downwards toward the bottom inlet expelling ahead (in a sort of milking action) any contained solids which fall back into the stream due to gravity. The control box has a pinch valve on the sample line which squeezes it closed and keeps the sample intake housing filled with pressurized air between aliquot ejections. This feature is useful when sampling liquids with high solids content which would tend to settle out in the intake while waiting to be ejected. Also, the air pressurization provides a reverse air

purge back through the "duckbill" thereby providing a sort of self cleaning action should any solids build up in the "duckbill" inlet. The manufacturer recommends this model in particular for raw sewage or liquids with solids content over 200 PPM.

Markland Model 102 Evaluation

1. Sampler intake should be free from clogging; "duckbill" will not pass any solids large enough to clog sample line; relatively high discharge pressure will also help prevent clogging.

2. Sampler intake presents a rigid obstruction to the flow.

3. Representativeness of sample is questionable at high flow rates.

4. Movement of large objects in the flow could damage or even physically destroy the sampler intake.

5. Has no automatic starter. Reverse air purge through "duckbill" provides a sort of self-cleaning action.

6. Collects spot samples at preset time intervals and composites them in a suitable container.

7. Appears unsuitable for collection of either floatable materials or coarser bottom solids.

8. Automatic refrigeration is available as an option. Cross-contamination appears likely.

9. Unit is not designed for manhole operation.

10. Cannot withstand total immersion.

11. Should be able to operate in freezing ambients for some period of time.

12. Lifts in excess of 18.3m (60 ft) should be obtainable, putting very little restriction on operating head conditions.

| | |
|---|---|
| Designation: | MARKLAND MODEL 104T |
| Manufacturer: | Markland Specialty Engineering Ltd.<br>Box 145<br>Etobicoke, Ontario (Canada)<br>Phone (416) 625-0930 |
| Sampler Intake: | Small gravity filled sample chamber equipped with patented non-clogging "duckbill" inlet control. |
| Gathering Method: | Forced flow due to pneumatic ejection. |
| Sample Lift: | 18.3m (60 ft) standard. |
| Line Size: | 0.64 cm (1/4 in.) I.D. |
| Sample Flow Rate: | Varies with pressure and lift. |
| Sample Capacity: | Composites 75-mℓ aliquots into a 7.6ℓ (2 gal) bottle. |
| Controls: | Solid state predetermining digital counter accepts signals from an external flowmeter to gather samples proportional to flow. Optional solid state clock allows sampling at predetermined time intervals. |
| Power Source: | Plant air for Model 104T;<br>Model 2104T includes air compressor and motor; 110 VAC. |
| Sample Refrigerator: | 0.17 cu m (16 cu ft) automatic refrigerator to hold either a 7.6 or 18.9ℓ (2 or 5 gal) bottle available. |
| Construction Materials: | Standard intake housing is aluminum alloy; stainless steel and PVC are available as alternates. Standard "duckbill" is EPT; Buna-N and Viton are available. Tygon tubing, stainless steel or plastic fittings, polyethylene sample bottle, fiberglass case. |

Basic Dimensions: Sample intake is 7.3 cm (2.875 in.) diameter x 12.7 cm (5 in.) H; fixed installation.

Base Price: $1094 for Model 104T including control box, remote sampling intake, air filter, regulator and pressure gauge, 100 feet of tubing, and 2 gallon sample collection bottle; $1134 for Model 2104T including control box, remote sampling intake, air compressor and motor, 100 feet of tubing, and 2 gallon sample collection bottle. Add $135 for stainless steel or PVC intake, $20 for Viton "duckbill", $335 for refrigerator, $10 for 5-gallon sample container, and $215 for plug-in solid state clock module. All prices include air freight and duty. Model 300 discrete 24 bottle attachment is $795.

General Comments: The heart of the sampler is the patented rubber "duckbill" in the sample intake housing. It is round on the bottom and flattens out to a flaired top where the opening is simply a slit. When the intake is vented to atmosphere, the hydrostatic liquid head forces a sample up through the vertical inlet and through the "duckbill" slit, which acts like a screen (the lips can only open a limited amount) until the pressure is equalized. When air pressure is applied to raise the sample, the "duckbill" lips close (acting as a check valve), and the squeezing-shut progresses downwards toward the bottom inlet expelling ahead (in a sort of milking action) any contained solids which fall back into the stream due to gravity. The two digit counter, when connected to

an external flowmeter providing dry contact pulsing closed momentarily with frequency proportional to flow, counts down from the preset point to zero. When zero is reached, the sampling circuit latches in and extracts an aliquot while simultaneously resetting the counter back to the reset point. Pulses received while the aliquot is being ejected are counted without loss.

Markland Model 104T Evaluation

1. Sampler intake should be free from clogging; "duckbill" will not pass any solids large enough to clog sample line; relatively high discharge pressure will also help prevent clogging.

2. Sampler intake presents a rigid obstruction to the flow.

3. Sampling chamber will fill immediately following discharge of previous aliquot, resulting in a sample not necessarily representative of conditions in the sewer at the time of the next triggering signal. Representativeness is also questionable at high flow rates.

4. Movement of large objects in the flow could damage or even physically destroy the sampler intake.

5. Has no automatic start or self-cleaning features.

6. Collects spot samples at either preset time intervals with clock option or paced by an external flowmeter and composites them in a suitable container.

7. Appears unsuitable for collection of either floatable materials or coarser bottom solids.

8. Automatic refrigeration is available as an option. Cross-contamination appears likely.

9. Unit is not designed for manhole operation.

10. Cannot withstand total immersion.

11. Should be able to operate in freezing ambients for some period of time.

12. Lifts in excess of 18.3m (60 ft) should be obtainable putting very little restriction on operating head conditions.

| | |
|---|---|
| Designation: | NALCO MODEL S-100 |
| Manufacturer: | Nalco Chemical Company<br>180 N. Michigan Avenue<br>Chicago, Illinois 60601<br>Phone (312) 887-7500 |
| Sampler Intake: | End of 1.3 cm (1/2 in.) standard garden hose. |
| Gathering Method: | Forced flow from submersible pump. |
| Sample Lift: | Up to 7.6m (25 ft). |
| Line Size: | 1.3 cm (1/2 in.) garden hose. |
| Sample Flow Rate: | 28.4 ℓpm (7.5 gpm) at 6m (20 ft). |
| Sample Capacity: | Aliquot volume between 50 to 900 mℓ is a function of the preset diversion time (from 0.6 to 6.0 seconds); composited in user-supplied container. |
| Controls: | Can be used for either automatic or manual collection of samples. May be operated from a relay tripped by an external flowmeter or level switch contact or by a built-in interval timer that can be set from 3 minutes to 150 minutes. |
| Power Source: | 115 VAC |
| Sample Refrigerator: | None. |
| Construction Materials: | Plastic or rubber hose lines; cases are plastic. |
| Basic Dimensions: | Control box is 29 x 22 x 25 cm (11.5x8.5x10 in.) and weighs 4.5 kg (10 lbs); carrying case is 52 x 20 x 41 cm (20.5x8x16 in.) and weighs 12.2 kg (27 lbs); portable. |

| | |
|---|---|
| Base Price: | Not available at time of writing. |
| General Comments: | Can be used portably or installed permanently in one location. Inlet connection to the pump is a standard female garden hose fitting; outlet connection is a standard male garden hose fitting. Sample container must be provided by user. Unit has a pre-flush before each sample diversion to help assure representative flow, and drainage after each sample interval helps keep system clean and free of cross-contamination. |

Nalco Model S-100 Evaluation

1. Small screen over pump intake will help prevent clogging as will high flow rate; solenoid valve could be vulnerable to plugging.

2. Submersible pump offers obstruction to flow.

3. Should be capable of operation over the full range of flows.

4. Movement of small solids should not hamper operation; large objects could damage (or even physically destroy) pump unless special protection is provided by user.

5. No automatic starter. Gravity draining serves as a self-cleaning function and should help minimize cross-contamination. Pre-flush feature will also help.

6. Collects spot samples paced either by a built-in timer or external flowmeter and composites them in a user-supplied container.

7. Appears unsuitable for collection of either floatables or coarser bottom solids.

8. Sample container and protection must be supplied by user.

9. Unit is capable of manhole operation.

10. Unit cannot withstand total immersion.

11. Unit is not suited for prolonged operation in freezing ambients.

12. 7.5m (25 ft) maximum lift does not place a great operating restriction on unit.

| | |
|---|---|
| Designation: | NAPPE PORTA-POSITER SAMPLER |
| Manufacturer: | Nappe Corporation<br>Croton Falls Industrial Complex<br>Route 22<br>Croton Falls, New York 10519<br>Phone (914) 277-3085 |
| Sampler Intake: | Provided by user; sampler has 0.64cm (1/4 in.) NPT male hose fitting. |
| Gathering Method: | Suction lift from self-priming positive displacement pump with flexible impeller. |
| Sample Lift: | 1.8m (6 ft) maximum. |
| Line Size: | Line from petcock to sample container appears to be about 0.64 cm (1/4 in.) I.D. |
| Sample Flow Rate: | Pump delivers up to 11.4 ℓpm (3 gpm). Flow through by-pass to sample container depends upon petcock setting. |
| Sample Capacity: | Adjustable size aliquots (20 to 240 mℓ) are composited in a 3.8ℓ (1 gal) container. |
| Controls: | The pump is operated once every 15 minutes for a period of 20 seconds. A cycle progress indicator informs the operator of the time to next sample. There is also a manual advance to the next sample. |
| Power Source: | Model PPAC is 115 VAC; Model PPD is 12 VDC and Model PPU is 115 VAC or 12 VDC. The 12 VDC power must be supplied by the user and is usually a wet-cell battery. |
| Sample Refrigator: | None. |

| | |
|---|---|
| Construction Materials: | Sample train is bronze, brass, Buna-N, and polyethylene. Casing is 16 gauge steel with baked enamel finish. |
| Basic Dimensions: | Basic unit is 24 x 22 x 34 cm (9.5x8.5x13.5 in.); Models PPAC and PPD weigh 10.4 kg (23 lbs); Model PPU weighs 11.8 kg (26 lbs); portable. |
| Base Price: | PPAC-4 $225.<br>PPD-4 $245.<br>PPU-4 $285. |
| General Comments: | At the end of each sampling cycle, both inlet and exhaust are gravity drained. This drainage provides a sort of backwashing to help prevent clogging. Model PPU is provided with two interchangeable power cords; models PPAC and PPD have permanent power cords. A sample intake strainer is available as an option at $12.50, and a mounting base is available at $10.00. 1.3 cm (1/2 in.) I.D. polyethylene hose is available at $1.50 per foot. |

Nappe Porta-Positer Model PPAC Evaluation

1. Unit would not appear to be vulnerable to clogging, especially with use of optional strainer, except perhaps at the petcock.

2. Obstruction of flow will depend upon user mounting of intake line and use of optional strainer.

3. Should operate reasonably well under all flow conditions. Although line velocity is high enough to transport suspended solids reasonably well, the tee branch and throttling effect of the petcock bypass valve may affect sample representativeness.

4. Movement of solids should not hamper operation.

5. No automatic starter. Gravity fall of liquid in lines when pump stops will provide a self-cleaning action of sorts.

6. Unit collects a simple composite sample over a 4 to 48 hour period. The 15-minute aliquot gathering frequency is non-adjustable.

7. Unsuitable for collection of samples of floatables or coarser bottom solids without specially designed intake by user.

8. No refrigeration; case offers some sample protection. Small amount of cross-contamination might be experienced.

9. Unit appears capable of manhole operation.

10. Unit cannot withstand total immersion.

11. Not ideally suited for operation in freezing ambient conditions.

12. Maximum lift of 1.8m (5 ft) puts restrictions on use of unit.

| | |
|---|---|
| Designation: | NAPPE SERIES 46 LIQUID SAMPLER |
| Manufacturer: | Nappe Corporation<br>Croton Falls Industrial Complex<br>Route 22<br>Croton Falls, New York 10519<br>Phone (914) 277-3085 |
| Sampler Intake: | Provided by user; sampler has 0.95 cm (3/8 in.) NPT female pipe inlet. |
| Gathering Method: | Suction lift from self-priming pump with flexible impeller. |
| Sample Lift: | To 4.6m (15 ft) suction; to 6m (20 ft) discharge. |
| Line Size: | 0.95 cm (3/8 in.) I.D. |
| Sampler Flow Rate: | Pump delivers up to 13.2 ℓpm (3.5 gpm). |
| Sample Capacity: | Adjustable size aliquots are composited in a 11.4ℓ (3 gal) sample container. |
| Controls: | Sampler can be triggered by an adjustable timer which sets the frequency between samples or by an external flowmeter for flow-proportional sampling. Pump is programmed for one of three cycles depending upon sample requirements. |
| Power Source: | 115 VAC. |
| Sample Refrigerator: | Refrigeration is available and consists of a chilling coil immersed in the sample container. The compressor is housed in a compartment on top of the main sample cabinet. Temperature control is by an expansion valve that is factory set at 7°C (45°F). |

| | |
|---|---|
| Construction Materials | Pump is stainless steel with neoprene impeller. Solenoid is stainless steel and neoprene. Sample container is polyethylene. Hoses are reinforced neoprene. Sampler cabinet is primed aluminum finished in baked enamel. Hinges are stainless steel; lock is brass. |
| Basic Dimensions: | Non-refrigerated - 39 x 34 x 102 cm (15.4x13.5x40.1 in.); Refrigerated - 39 x 34 x 130 cm (15.4x13.5x51.1 in.); Shipping weight is 91 kg (200 lbs); designed for fixed installation. |
| Base Price: | $1100 to $1800 depending upon options. |
| General Comments: | The pump is programmed for one of three cycles. For lifts up to 3m (10 ft), the pump operates for 30 seconds prior to and during the sample diversion; for lifts from 3 to 4.6m (10 to 15 ft), the pump runs continuously and is protected by a pressure sensor; and for lifts over 4.6m (15 ft), the pump is located outside the cabinet, alongside the sampling point and runs continuously. The electrical programmer is housed on the cabinet door and is hinged to permit access. Sealed disconnect couplings are used on the refrigeration lines to permit cleaning of coils. For situations where the sampling point is not accessible to the sampler, an optional submersible pump is available. |

Nappe Series 46 Liquid Sampler Evaluation

1. Unit would not appear to be vulnerable to clogging, except at hose fittings and solenoid valve.

2. Obstruction of flow will depend upon user mounting of intake line.

3. Should operate reasonably well under all flow conditions.

4. Movement of solids should not hamper operation.

5. No automatic starter. Gravity fall of liquid in lines when pump stops will provide a sort of self-cleaning action. Pump runs 30 seconds before extraction of each sample, keeping lines reasonably clear.

6. Can collect either timer or flowmeter paced samples and composites them in a 11.4ℓ (3 gal) container. A manual test switch operates the solenoid valve and the self-priming pump.

7. Unsuitable for collection of samples of floatables and coarser bottom solids without specially designed intake by user.

8. Refrigeration is available as an option. Cross-contamination should not be a large problem.

9. Unit not designed for manhole operation.

10. Cannot withstand immersion.

11. Thermostatically controlled heater allows operation in freezing ambients.

12. Maximum lift of 6m (20 ft) does not place severe restrictions on use of unit.

| | |
|---|---|
| Designation: | NOASCONO AUTOMATIC SHIFT SAMPLER |
| Manufacturer: | Paul Noascono Company<br>805 Illinois Avenue<br>Collinsville, Illinois 62234<br>Phone (618) 344-3706 |
| Sampler Intake: | End of 0.48 cm (3/16 in.) I.D. suction tube installed to suit by user. |
| Gathering Method: | Suction lift from peristaltic pump. |
| Sample Lift: | Up to 9m (30 ft). |
| Line Size: | 0.48 cm (3/16 in.) I.D. |
| Sample Flow Rate: | Up to 8 mℓ per minute. |
| Sample Capacity: | Ten user-supplied wide mouth, 3.8ℓ (1 gal) jars are sequentially filled from continuously running pump; one jar requires 8 hours to fill. |
| Controls: | On/off switch. Speed regulation is accomplished by a variable pump pulley and with a two-step motor pulley. |
| Power Source: | 110 VAC. |
| Sample Refrigerator: | None. |
| Construction Materials: | Sampler box is "Benelex", plywood, and stainless steel. Sampling train is Mayon, teflon, and Tygon. Other parts are bronze and plastic. |
| Basic Dimensions: | 41 x 122 x 56 cm (16x48x22 in.); weighs 39 kg (87 lbs); portable. |
| Base Price: | Not available at time of writing. |